

## **CHAPTER 9: LOW IMPACT DEVELOPMENT REQUIREMENTS FOR INFILTRATION AND REUSE OF STORMWATER**

Volumetric increases to the city stormwater conveyance system, as the result of increased impervious surface have resulted in the need to upsize stormdrain systems in the City. While detention is effective in controlling peak discharges, the volumetric increase is not abated. Low Impact Development (LID) is an accepted standard in which stormwater is infiltrated and/or reused, resulting in the mitigation of these volume increases.

Low Impact Development will address water quality concerns that can arise when impervious area is added to previously undeveloped sites. Runoff from impervious areas often contains suspended solids and heavy metals along with other contaminants. Many of the Low Impact Development measures will remove some of these pollutants.

Water conservation is also a consideration when designing for the Low Impact Development requirements. Water can in many cases be reused or directed towards landscape areas in an effort to reduce water consumption.

The use of LID will help control volume increases and hence reduce the cost of upsizing downstream infrastructure as well as promote water conservation.

### **9.1. POLICIES**

- a. Stormwater LID is required for all new subdivisions, commercial and industrial developments, redevelopment of non-conforming sites (i.e., existing developed sites that do not have detention that have been razed and vacant for greater than six months), and other developments greater than 1/4 acre in size. LID shall be implemented according to the following schedule as measured from the effective date of Ordinance No. 2009-07:
  1. For the first year the program will be voluntary.
  2. In the second year, developments will be required to retain/infiltrate one half (1/2) inch of runoff from all additional impervious surfaces.
  3. In the third year, developments will be required to retain/infiltrate one (1) inch of runoff from all additional impervious surfaces. The requirement to detain for the 2-year storm will no longer be required once the 1-inch threshold is implemented.
- b. LID requirements may be waived by the Stormwater Manager for the following:
  1. Single-family residential structure or lot (i.e., not associated with a new subdivision).
  2. Residential subdivisions with lot areas  $\geq$  1 acre in area, if it can be shown that such a

waiver will not result in any adverse downstream effects, nor create any disturbance to the existing drainage patterns both within and adjacent to the subdivision.

3. Developments less than 1/4 acre or increases in impervious area of  $\leq 5,000$  square feet. It must be demonstrated to the satisfaction of the Stormwater Manager that there will be no increase in the potential for damages to adjacent properties and adequate off-site or downstream drainage capacity is available.
- c. For developments requiring LID, all new impervious surfaces shall be infiltrated or reused in accordance with the current applicable standard.
- d. The methodology for determining the required volume of stormwater to be infiltrated or reused is as follows:  
Impervious Surface (square feet) X current requirement (ft.) (e.g. 1/2 inch or 1 inch) = volume requirement
- e. In order to provide specific guidance for the design of these LID facilities, the City has developed the City of Flagstaff Low Impact Development (LID) Guidance Manual. The Manual is hereby adopted as part of these Requirements.
- f. A waiver may be granted by the Stormwater Manager for deviations from the Integrated Management Practice designs in the LID Guidance Manual. The waiver request will be reviewed on a case-by-case basis and will require supporting analysis, documentation, etc. (as determined by the Stormwater Manager) be submitted and approved prior to granting of the waiver.
- g. The City established a maximum ponding depth of (.3) three-tenths of (1) one foot without an engineered infiltration system.
- h. Developments which are phased shall prepare a master stormwater LID plan for the entire development. The master stormwater LID plan must either be implemented with the first phase, if possible, or LID measures must stand alone for each phase. Interim temporary LID facilities may be required for phasing.
- i. The City of Flagstaff shall only accept large-scale LID facilities for operation and maintenance. The City shall not accept small-scale, local on-site LID's for operation, maintenance, or liability.
- j. Maintenance of local on-site LID facilities shall be the responsibility of the property owner or homeowner's association. The City shall reserve the right to periodically inspect any LID facilities to verify that regular maintenance activities are being performed. Final Plats; Covenants, Conditions, and Restrictions (CC&R's); and/or Development Plans shall include a special note stating that (1) the owner(s) shall be solely responsible for the operation, maintenance, and liability for all LID facilities; and, (2) the City of Flagstaff may periodically inspect said LID facilities to verify that regular maintenance activities are being performed adequately.
- k. The City of Flagstaff Parks and Recreation Division shall review and approve proposed

stormwater LID facilities designed within designated public areas or parks. Review and approval from the Parks and Recreation Commission may also be required.

1. No part of a private LID shall be constructed in a public right-of-way or public utility easement.

## **9.2. SUBDIVISION REQUIREMENTS**

All new subdivisions are required to provide LID for the entire subdivision, including the respective one-half of all abutting streets to the subdivision. Two or more subdivisions may join together to provide a common LID facility.

Preliminary Plat submittals shall be accompanied by a preliminary drainage report that identifies LID locations, types and sizes and a preliminary calculation of the required volume.

All Final Plat submittals require a final drainage report, in accordance with Chapter 2 of this manual, which technically demonstrates compliance with City of Flagstaff Floodplain Management Regulations, Stormwater Management requirements, and the drainage policies and design criteria set forth in this manual. This report must be submitted with the subdivision improvement plans and must be accepted prior to recording the final plat.

Urbanization and other land development activities, including construction of roads, changes natural pervious areas into impervious, altered surfaces. In addition, natural drainage systems are often replaced by lined channels, storm drains, and curbed streets. The result of such activities is an increase in the volume of runoff, peak discharge rates, erosion, and non-point source pollution due to the reduction in infiltration and natural vegetation.

In the absence of regional detention facilities and due to inadequate downstream capacities of existing streets, storm drain systems or channels, local on-site or sub-regional LID facilities are necessary to attenuate the increased runoff caused by development. LID facilities can also serve a dual purpose by improving the quality of stormwater discharges. The temporary storage of stormwater runoff can reduce the extent of downstream flooding, soil erosion, sedimentation, and surface water pollution. LID facilities can also be used to reduce the costs associated with large storm drain systems.